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MINERAL NUTRITION UPDATE

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Minerals constitute a small percentage of the swine ration, but their importance to the health and well-being of the pig cannot be overemphasized. To make sure that pigs meet their daily requirements for minerals without excess, minerals should be fed in a completely mixed ration.

At least 13 minerals are known to be required by the pig. These include calcium, phosphorus, potassium, sodium, chlorine, magnesium, sulfur, zinc, iron, manganese, copper, iodine and selenium. Other mineral elements probably are also required but at levels so low that their dietary need has not been demonstrated.

The minerals that are required to be added to most swine diets in greatest amounts are calcium, phosphorus and salt (sodium and chlorine). Cereal grains and plant by-products such as soybean meal are particularly low in calcium. Although they do contain considerably more phosphorus than calcium, the phosphorus is largely phytin phosphorus, a form that is poorly utilized by swine. To obtain proper calcium and phosphorus utilization, it is necessary that an adequate level of both of these minerals be fed, that there is a suitable calcium to phosphorus ratio in the diet and that a sufficient amount of vitamin D is available. The desired ratio of between 1.0 and 1.5 calcium to 1.0 total phosphorus is recommended.

Recent research has shown that a level of .25% added sodium chloride (salt) will meet the dietary sodium and chlorine needs of the growing pigs. For gestating and lactating sows, it is suggested that a level of .5% salt be fed. Swine can tolerate quite high levels of salt if drinking water is available at all times. However, toxicity has been observed with as little as 1.0% dietary salt when water was restricted.

Iron deficiency still occurs, more often in young pigs than in pigs of weaning age or older. The need is more critical during the suckling period because of the low level of iron stores at birth and that sow's milk is low in iron. A single intramuscular injection of 100 to 200 mg of iron, as iron dextran, given in the first 3 days of life will protect the pig until weaning. After weaning a level of 80 ppm of iron in the diet is considered adequate. Ferrous sulfate and ferric ammonium citrate are good sources of iron, while ferrous carbonate is a poor source and ferric oxide is ineffective.

A low level of zinc in the diet will cause a nutritional disease known as parakeratosis. Symptoms of parakeratosis include a reduced appetite, slow growth, unthriftiness and a thickening and encrusting of the skin, particularly on the extremities. Adding 50 mg of zinc per kg of diet will prevent parakeratosis unless the diet contains a high level of calcium (above 1%).

The dietary zinc requirement is influenced by the calcium level of the diet and the protein source among several factors.

Selenium has been reported to be deficient in many areas of the midwest. Frequently the first sign of trouble is the occurrence of sudden death in weaned pigs, particularly after the co-mingling of litters. The dietary requirement for selenium is between .1 and .2 mg per kg of diet. Grains and by-products of plants grown in South Dakota will generally contain a higher level of selenium than the suggested requirement. However, adding the FDA approved level (.1 mg/kg) of selenium to a swine diet would not be expected to cause any toxicity problem because selenium toxicity does not occur until the diet contains over 5 mg of selenium per kilogram.

Other mineral deficiencies may exist in certain conditions. The following table gives symptoms of nutrient deficiencies.

Table 1. Signs of Mineral Deficiencies

Nutrient	Nutrient Deficiency Signs
Calcium	Rickets, osteomalacia, tetany
Phosphorus	Poor growth, rickets, osteomalacia
Sodium	Poor appetite, low water consumption, unthriftiness
Chlorine	Poor growth
Potassium	Poor appetite, rough hair coat, emaciation
Magnesium	Poor growth, stepping syndrome, tetany
Iron	Rough hair coat, anemia, poor growth, thumps
Copper	Leg weakness, incoordination
Zinc	Parakeratosis, poor growth, poor appetite
Iodine	Goiter; weak, hairless pigs at birth
Manganese	Lameness, weak pigs at birth
Selenium	Sudden death, mulberry heart